An integrated look at the life spans of Arizona animals

Charting Animal Life Spans

LESSON OVERVIEW

Using a simple chart of animal life spans, students practice 2-digit subtraction and create a pictograph showing what they have discovered about differences in length of life.

SUGGESTED GRADE LEVELS

- 2

ENDURING UNDERSTANDINGS

- Numbers help make sense of the world.
- Graphs, charts, and pictographs help organize information into more easily understood formats.
- All living things have a life cycle that ends with the death of the organism.
- An organism's life may be short or long in comparison to a human's but all are made up of similar stages.

OBJECTIVES

Students will:

- Compare numbers and use proper vocabulary to describe their relationship.
- Put a list of 2-digit numbers in order least to greatest.
- Formulate questions about relationships between numbers.
- Subtract 2-digit numbers using regrouping.
- Interpret information on a pictograph.
- Use a pictograph to solve problems.

ARIZONA DEPARTMENT OF EDUCATION STANDARDS

Grade	Science	Mathematics	Reading
2	S1-C1-02; S1-C3-01; S4-C2-02; S4-C2-03	S1-C1-11; S1-C1-13; S1-C2-03; S1-C2-05; S2-C1-01; S2-C1-02; S2-C1-03, S2-C1-04; S2-C1-05; S2-C1-06	S3-C1-05

Note: The full text of these standards can be found in Appendix A.

TIME FRAME

- 2 day (30 – 45 minutes each day)

MATERIALS

- *Average Life Span in Years* worksheet (one per student)
- Sample pictograph

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- Animal cards with photo and life span
- Easy-to-remove labels or stickers
- *How Many Candles?* picture book by Helen Griffith (optional)
- Large butcher paper
- Markers
- *Graphing Life Spans* Rubric
- Blank transparency
- Overhead projector

TEACHER PREPARATION

- Make a copy of the *Average Life Span in Years* worksheet for each student.
- Gather enough markers (or crayons or colored pencils) and paper for each group to use.
- Use the Arizona Game and Fish website (azgfd.gov) or other resources to locate pictures of common animals. There should be enough for each student. On the front of the picture, put the name of the animal. On the back, put the life span of that animal. Use a label or sticker to cover the life span.
- Students should have a basic understanding of pictographs. Appendix B provides a short lesson to introduce this concept.
- Make an overhead of the sample pictograph.

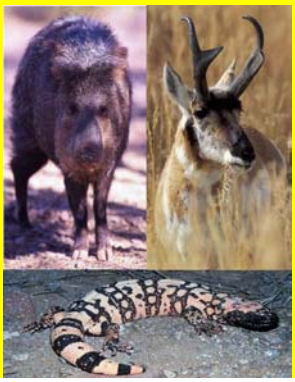
SUGGESTED PROCEDURES

Optional Introduction:

1. Show the students the front cover of *the How Many Candles?* book by Helen Griffith. Read the title and ask students what they think the name means. If no one guesses that it's about birthday candles, guide them to this idea. Continue the discussion. How many candles were on their last cake? Who would have the most candles in their family?
2. Read the book aloud. Be sure to stop occasionally to discuss. What is a life span? Do short life spans contain all the same stages?
3. When the reading is finished, continue the discussion.

General Procedures:

1. Give each child an animal card. Ask students to estimate (and write down on their card) how long they believe their life form generally lives, then arrange themselves in order from shortest to longest life. Encourage dialog and allow students to adjust their estimates.
2. Once students are lined up, they should take off the sticker covering the actual average life span. (Explain *average* briefly only to clarify that some animals may live longer, and some may live shorter lives.) Were they correct? Demonstrate how to subtract to find how close their estimates were. Introduce the vocabulary words: *most, least, equal, more than, less than, and greatest* as appropriate. Post vocabulary on a word wall to remind students of proper terminology.
3. Have the students line up in order again, this time using the average life spans.
4. As a group, find out the range of the life spans by subtracting the shortest from the longest. Begin discussion of why some animals live longer than others.



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5. Hand out the chart showing animal life spans. In pairs, have students examine the chart and formulate questions. Possible questions include "Why do two different rabbits, the cottontail and the jack rabbit, have such different life spans?" or "Do birds or mammals live longer?".
6. Large group discussion of the findings and questions. Be sure to reinforce the math terms.
7. Place the sample pictograph on the overhead. Review how to read pictographs. Ask some comprehension questions. Which animal has the greatest life span? Which animal lives the least number of years? Which animals have equal life spans?
8. Pairs join with another pair to form a team of 4. They are going to make a pictograph showing the life spans of five different animals. Students should use the animals they were given initially. In addition, the group should select another from the table for a for a total of 5 animals. Charts should include any other observations group members find interesting (i.e., wild vs. captive life spans). Charts MUST use correct terminology! Groups are to prepare the pictograph, but individuals are responsible for being able to answer any of the following questions about the relationships between the life spans:
    a. What animal has the greatest life span?
    b. What animal lives the least years?
    c. Do any of the animals have equal life spans?
    d. How much is one animal's life span more than or less than another's?
9. Allow group time for planning and creating the pictograph.
10. Individuals write a brief reflection on creating the pictograph. How did they like creating it? What other uses might these have? Is there anything that is unclear or confusing about pictographs?
11. Teacher interviews groups and individuals to check for understanding.
12. Students check each other's work by exchanging charts and calcluating the differences.
13. Students write a reflection on animal life spans and note what they understand, are unsure of, and/or still have questions about in subtracting 2-digit numbers.

ASSESSMENT

- Informal observation of groups
- Teacher-generated quiz on subtraction, pictographs, and math vocabulary
- Individual reflections on life spans and pictographs
- Life span rubric

EXTENSIONS

- Based on their pictograph reflection, have students create another, individual pictograph.
- Students can go online or to the library to research more about animal life spans.

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Appendix A: Arizona Department of Education Standards – Full Text

Science Standards

Grade	Strand	Concept	Performance Objective
2	1	1 –Observations, Questions, and Hypotheses	2 – Predict the results of an investigation (e.g., in animal life cycles, phases of matter, the water cycle)
		3 – Analysis and Conclusions	1 – Organize data using graphs (i.e., pictograph, tally chart), tables, and journals
	4	2 – Life Cycles	2 – Describe the life cycles of various mammals 3 – Compare the life cycles of carious organisms

Mathematics Standards

Grade	Strand	Concept	Performance Objective
2	1	1 – Number Sense	11 – Compare two whole numbers through 999 13 – Order three or more while numbers through 999 (least to greatest or greatest to least)
		2 – Numerical Operations	3 – State addition and subtraction facts 5 – Subtract one- and two-digit whole numbers through regrouping
	2	1 – Data Analysis (Statistics)	1 – Formulate questions to collect data in contextual situations 2 – Make a simple pictograph of tally chart with appropriate labels from organized data 3 – Interpret pictographs using terms such as most, least, equal, more than, less than, and greatest 4 – Answer questions about a pictograph using terms such as most, least, equal, more than, less than, and greatest 5 – Formulate questions based on graphs, charts, and tables 6 – Solve problems using graphs, charts, and tables

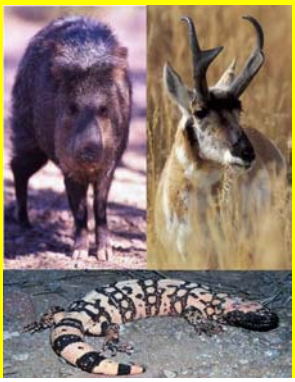
Reading Standards

Grade	Strand	Concept	Performance Objective
2	3	1 – Expository Text	5 – Locate specific information from graphic features (e.g., charts, maps, diagrams, illustrations, tables, timelines) of expository text

Appendix B: Pictograph Lesson

This is just one example of how pictographs can be taught for the first time. It is important, however, that the students know how to do this in order to successfully complete the lesson.

1. On the board, write down the following food types: pizza, hot dog, spaghetti, and fish. Leave some space beneath each one.
2. Inform the students that the class is going to have a vote. We want to know which food item is liked by the greatest number of people. Each person is going to get the opportunity to vote for one of the four foods on the board.
3. One at a time, call out the food and ask the students to raise their hand. Count the number of hands and write this number under the name.
4. When all students have voted, ask the class which food had the most votes. Which one had the least?
5. Describe the purpose of graphing. Sometimes scientists use graphs and pictures to better understand numbers.
6. Ask the students to decide on an easy to draw picture that could be used to represent each of the items. Have a volunteer draw these pictures. Explain that each of these pictures will represent the number of students that voted for that food. Each picture may represent more than one person. Decide on how many students each picture will represent. Two would be a very good number. Ask the students what we would draw if there were only one person. If they do not come up with it one their own, guide them to the idea that we would draw half of the picture.
7. As a class, make a pictograph using the data and the pictures. Draw the x- and y-axes explaining that the food goes on the bottom while the numbers go on the side. Have a student draw the pictures while the other students count the number of pictures that are necessary.
8. When the all the food items have been drawn, discuss the pictograph. Which food had the most votes? Which had the least? Are these the same as we said before? What is the purpose of a pictograph?
9. Divide the class into groups of four students.
10. Explain that they will now have to make a new pictograph in their groups.
11. Pass out a bag of M & Ms to each group. Instruct them to make a pictograph showing the number of candies for each color.
12. Before beginning, brainstorm ways to complete this assignment. Make sure they are aware that they need to group the candies by color first.
13. Give the groups time to work on their pictographs. As they work, move around the room and talk to the groups. Ask them questions to make sure they understand how to interpret these graphs.



Appendix C: Relevant Picture Books

It is recommended that students be introduced to the idea of life span by using a picture book. Below is a list of suggested titles along with a brief description. The first book is highly recommended and was used in the suggested procedures.

How Many Candles? by Helen Griffith

- A dog wishes to surprise his master with a cake for his tenth birthday. He is aware that this is seventy in dog years. He has several encounters with different animals, including a turtle that believes it is such a short time to a swarm of gnats that claim that nothing can live that long.

Helen the Fish by Virginia Kroll

- After a long life of three years, a goldfish dies. The child is made to understand that death is part of life and that life continues. Eventually, the child gets a fish for her friend.

Winter Fox by Jennifer Brutschy

- A little girl loses her bunny to a hungry fox. When she goes out with her father to hunt the fox, she realizes how thin and alone the fox is and asks her father not to kill it.

Gray Fox by Jonathan London

- This book follows the life of a fox from a young pup to his eventual death on the highway. Then, his own children grow up and go out into the world.

Tracks in the Sand by Loreen Leedy

- This book introduces children to the life cycle of sea turtles, from mating to egg develop and hatching.

Appendix D: Worksheets and Overheads

The pages that follow contain the worksheets listed below:

A. *Sample Pictograph Overhead* – Use this as an example of what is expected from the group pictographs (1 page)

B. *Average Life Span in Years* – A reference sheet that provides the average life span of a variety of Arizona plants and animals (1 page)

C. *Graphing Life Spans* Rubric – A tool to help teachers grade the pictographs (1 page)